(12) **United States Patent**   (10) **Patent No.:   US 6,956,826 B1**

Binder   (45) **Date of Patent: Oct. 18, 2005**

(54) **LOCAL AREA NETWORK FOR DISTRIBUTING DATA COMMUNICATION, SENSING AND CONTROL SIGNALS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/349,020**

(22) Filed: **Jul. 7, 1999**

(51) **Int. Cl.**^{7} **H04L 12/00**
(52) **U.S. Cl.** **370/254**
(58) **Field of Search** 370/254, 452, 370/451, 293, 502; 702/188; 375/211; 714/13; 340/286.01; 341/73

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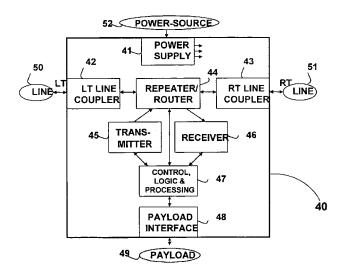*Primary Examiner*—Edwin C. Holloway, III
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(57)   **ABSTRACT**

A network for carrying out control, sensing and data communications, comprising a plurality of nodes. Each node may be connected to a payload, which comprises sensors, actuators and DTE's. The network is formed using a plurality of independent communication links, each based on electrically-conducting communication media comprising at least two conductors and interconnecting two nodes, in a point-to-point configuration. During network operation, nodes can be dynamically configured as either data-generating nodes, wherein data is generated and transmitted into the network, or as receiver/repeater/router nodes, wherein received data is repeated from a receiver port to all output ports. During normal network operation, the network shifts from state to state. Each state is characterized by assigning a single node as the data-generating node, and configuring all other nodes in the network as repeaters and receivers. The network can be configured in linear or circular topology, or any mixture of both. The nodes and the payloads can each be powered by local power supply or via the network wiring. In the latter case, dedicated wires can be used, or the same conductors may be employed for both power distribution and communication. Network control can be performed external to the network, or by using the network itself as transport for control messages. Shifting from state to state can be done by selecting sequential nodes to be the data-generating node, or by selecting arbitrary nodes to be the data-generating node.

14 Claims, 8 Drawing Sheets